observed, and its elliptical elements having been computed on several hands with marked consistency, we may assume that its present form of orbit is known with considerable accuracy. W. F. DENNING

THE MAKING OF ENGLAND[1]

IN an instructive article in *Macmillan's Magazine* for this month, Prof. Geikie shows what important influences the geological development of our country has had upon its history. Prof. Geikie begins in long past prehistoric times, when England formed part of the European continent, and rapidly traces the changes which have gone to make England what it is; shows the bearing which the physical geography of the country had on the settlements of the early inhabitants, pre-Aryan and Aryan, and in later times on the development of England's commerce, and the growth of her greatness. What Prof. Geikie does for England as a whole Mr. Green attempts to do for "Anglo-Saxon" England, for that England which was destined to form the broad basis of the England of the present day. Mr. Green, in his well-known "History of England," as we pointed out at the time of its publication, made some attempt to take account of the physical conditions of our country in so far as they have influenced her history; and this is essentially the method he followed in his valuable text-book of British Geography. Hitherto historians have taken little or no account of the environment of nations, although it is evident that that must be a factor of the first importance in determining the character of a people and their historical development. In a general way every one must admit that the climate and physical condition of a country have their influence on the character of a people; but in its strictly scientific aspect the subject is yet in its infancy, and we hope that Mr. Green's example will encourage others, both historians and scientific geographers, to work it out thoughtfully and minutely. It is not our province to examine Mr. Green's work critically, as an historical treatise; we shall leave it to others to say whether all his statements and inferences are authorised by the documents on which they are based. But that the work is full both of interest and instruction every one must admit. Mr. Green's geographical and topographical instincts are unusually keen, and his faculty for clothing the dry bones of chronicles, and antiquarian discoveries, and ethnological data with living flesh and blood is probably unsurpassed. In a series of pictures he brings before us our Teutonic forefathers with a vivid force that has all the interest and excitement of reality. We see them hovering off the shores of England, even while the Romans were in possession, watching their opportunity to pounce down upon the prosperous towns and homesteads; we see them at last get a firm footing, south and east and north, holding the coast regions with comparative ease, but baffled for years by the primeval forests and thick underwood, the widespread marshes and impassable rivers. Not for at least two centuries were they able quite to overcome these obstacles, and these, with the other physical features of the country, determine the relative positions ultimately occupied by Jute, Angle, Saxon, and Celt. With regard to the last-mentioned, Mr. Green, from a study of the finds in the Settle and other caves, is able to bring before us a touching picture of the flight of the Celtic men, women, and children with what utensils and ornaments they could carry with them before the advance of the ruthless Saxon.

"The hurry of their flight may be gathered from the relics their cave-life has left behind it. There was clearly little time to do more than to drive off the cattle, the swine, the goats, whose bones lie scattered round the hearth fire at the mouth of the cave, where they served the wretched fugitives for food. The women must have buckled hastily their brooches of bronze or parti-coloured enamel, the peculiar workmanship of Celtic Britain, and snatched up a few household implements as they hurried away. The men, no doubt, girded on as hastily the swords whose dainty sword-hilts of ivory and bronze still remain to tell the tale of their doom, and hiding in their breast what money the house contained, from coins of Trajan to the wretched 'minims' that told of the Empire's decay, mounted their horses to protect their flight. At nightfall all were crouching beneath the dripping roof of the cave or round the fire that was blazing at its mouth, and a long suffering began in which the fugitives lost year by year the memory of the civilisation from which they came. A few charred bones show how hunger drove them to slay their horses for food; reddened pebbles mark the hour when the new vessels they wrought were too weak to stand the fire, and their meal was cooked by dropping heated stones into the pot. A time seems to have come when their very spindles were exhausted, and the women who wove in that dark retreat made spindle whorls as they could from the bones that lay about them."

Then, when the invader has settled down in his conquests, the author restores to us with the broadness of reality, partly with material obtained by the researches of the archæologist, their mode of life, the nature and disposition of their *tuns* or settlements, the life of earl, ceorl, labourer, and slave, and to show us in the town *moot* the germs of our modern complicated parliament.

Mr. Green has evidently taken the greatest pains to master the physical geography and the great topographical features of the country at the landing of the Teutonic invaders. It was in many respects as different as possible from the surface with which we are at present familiar. The New Forest, Cranbourne Chase, and other scanty forests are but the remains of what at that period was almost one universal forest, impenetrable to all but natives, thickly clothed with underwood, and from which the great chalk-ranges rose, and provided almost the only settling-places of the inhabitants. Nowadays we find all our great cities along the river valleys or the coast; then the uplands were the only areas on which the inhabitants could settle, the marshy and wood-grown banks of the rivers being all but uninhabitable.

"It was not merely its distance from the seat of rule or the later date of its conquest that hindered the province from passing completely into the general body of the Empire. Its physical and its social circumstances offered yet greater obstacles to any effectual civilisation. Marvellous as was the rapid transformation of Britain in the hands of its conquerors, and greatly as its outer aspect came to differ from that of the island in which Claudius landed, it was far from being in this respect the land of later days. In spite of its roads, its towns, and its mining-works, it remained, even at the close of the Roman rule, an 'isle of blowing woodland,' a wild and half-reclaimed country, the bulk of whose surface was occupied by forest and waste. The rich and lower soil of the river valleys, indeed, which is now the favourite home of agriculture, had in the earliest times been densely covered with primæval scrub; and the only open spaces were those whose nature fitted them less for the growth of trees, the chalk downs and oolitic uplands that stretched in long lines across the face of Britain from the Channel to the Northern sea. In the earliest traces of our history these districts became the seats of a population and a tillage which have long fled from them as the gradual clearing away of the woodland drew men to the richer soil. Such a transfer of population seems faintly to have begun even before the coming of the Romans; and the roads which they drove through the heart of the country, the waste caused by their mines, the ever-widening circle of cultivation round their towns, must have quickened this social

[1] "The Making of England." By John Richard Green, M.A., LL.D Maps. (London: Macmillan and Co., 1881.)

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change. But even after four hundred years of their occupation the change was far from having been completely brought about. It is mainly in the natural clearings of the uplands that the population concentrated itself at the close of the Roman rule, and it is over these districts that the ruins of the villas or country houses of the Roman landowners are most thickly scattered."

As an instance of how Mr. Green is able to throw light

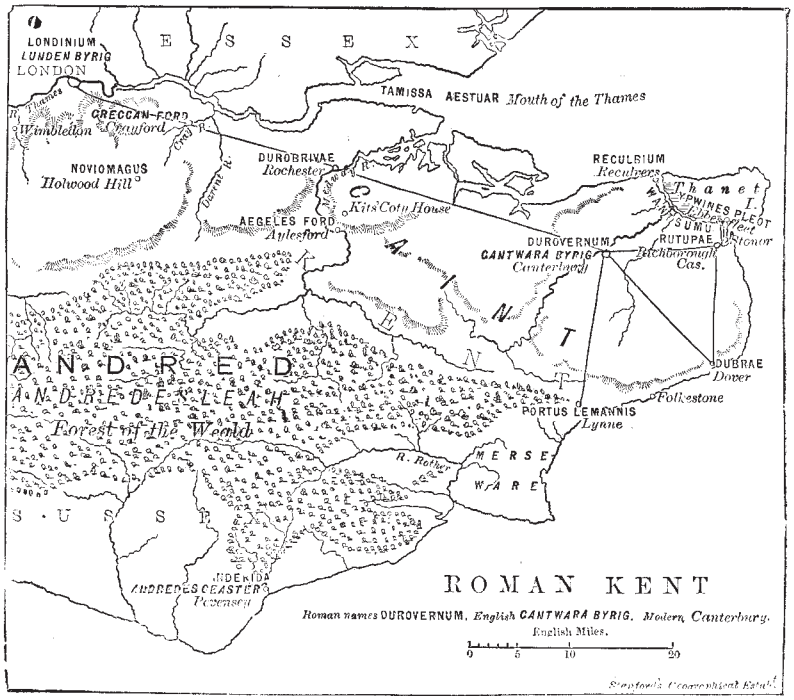


FIG. 1.

upon the progress of the Saxon conquest by his mastery of the physical condition of the country at the time, we quote another passage referring to the settlement of the Jutes. After describing the advance into the Caint (Kent) of the band under Hengest, Mr. Green goes on :—

"With this advance to the mouth of the Weald the

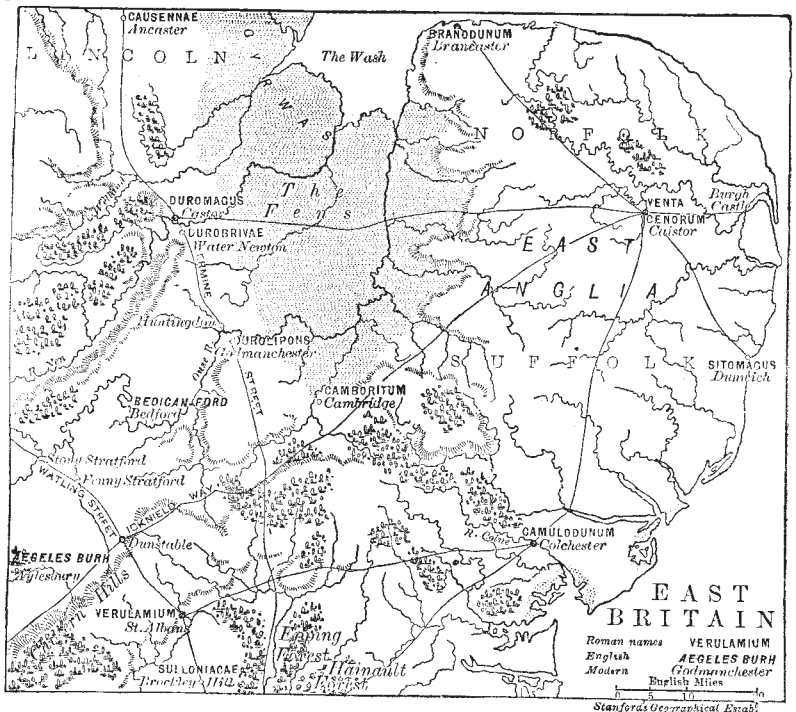


FIG. 2.

work of Hengest's men came to an end; nor did the Jutes from this time play any important part in the attack on the island, for their after-gains were limited to the Isle of Wight and a few districts on the Southampton Water. Fully indeed as the Caint was won, no district was less fitted to serve as a starting-point in any attack on Britain

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at large. While the Andredsweald, which lay in an impenetrable mass along its western border, extended southward behind the swamps of Romney Marsh to the coast of the Channel, a morass that stretched from the hills of Dulwich to the banks of the Thames blocked the narrow strip of open country between the northern edge of the Weald and the river. The more tempting waterway along the Thames itself was barred by the walls, if not by the fortified bridge, of London. The strength of these barriers is proved by the long pause which took place in the advance of the Jutes, for a century was to pass before they made any effort to penetrate further into the island" (Fig. 1).

Again the advance of the East Saxons was hindered by obstacles quite as formidable as the Andredsweald in South Britain. "As the South Saxons were prisoned within their narrow strip of coast by the reaches of the Andredsweald, so the East Saxons found themselves as effectually barred from any advance into the island by a chain of dense woodlands, the Waltham Chace of later ages, whose scanty relics have left hardly more then the names of Epping and Hainault Forests. These woodlands, which stretched at this time in a dense belt on either side the Roding along the western border of the district that the invaders had won from the Thames to the open downs above Saffron Walden, and were backed to the west by the marshy valley of the Lea, whose waters widened into an estuary as it reached the Thames, seem to have been wholly uninhabited, for no trace remains in their area of military stations or of the country houses or burial-places of the provincials. How impassable in fact these fastnesses had been found by the Romans is clear from the fact that even their road-makers never attempted to penetrate them. The lower portion of the Ermine Street, the road to the north, which in later days struck direct through this district from London to Huntingdon, did not exist in Roman times, and the British provincial was forced to make a circuit either by Leicester or Colchester on his way to Lincoln and York."

Further north again the progress of the Angles

EARLY LONDON.

(*Local names around of later date.*)

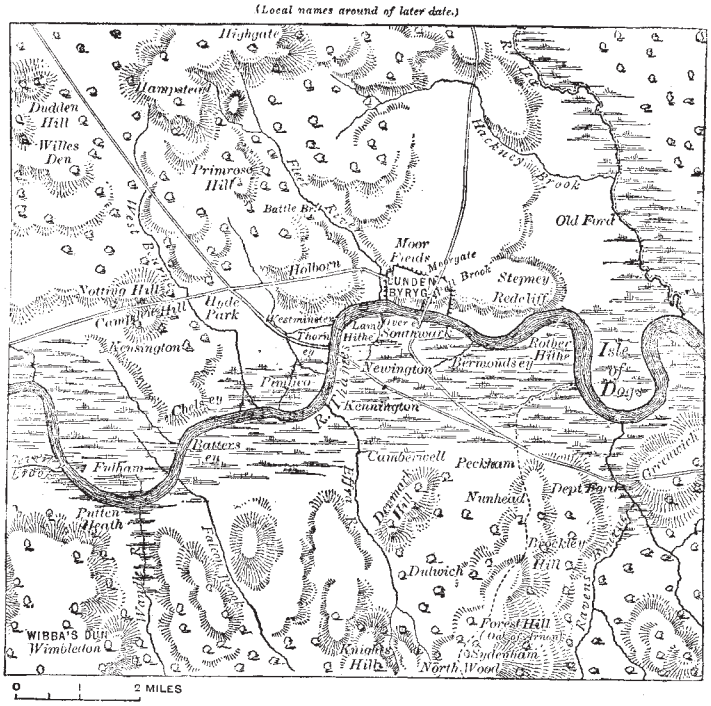


FIG. 3.

in what was known afterwards as East Anglia, and further north still in modern Lincolnshire, was naturally influenced by the widespread marsh, the remains of which are still to be seen in the Fen country. "We have seen what barriers held back the Jute of Kent and the Saxon on either side of him; but barriers as impassable held back the Engle of the eastern Gwent, for the forest-line which began on the Thames reached on along their western frontier to the Wash, and the Wash stretched to the northward from Newmarket to the sea. The fens which occupied this huge break in the eastern coast of Britain covered in the sixth century a far larger space than now; for while they stretched northward up the Witham almost as far as Lincoln, and southwards up the Cam as far as Cambridge, they reached inland to Huntingdon and Stamford, and the road between t. ose places skirted their bounds to the west. So vast a reach of tangled marsh offered few temptations to an invader; and we shall see grounds at a later time for believing that the Gyrwas, as the Engle freebooters who found a home in its islands called themselves, were for a long time too weak to break through the line of towns that guarded its inner border" (Fig. 2).

One of the most interesting passages, with its accompanying map, in Mr. Green's book, is that in which he describes the probable founding of London, the nature of the ground in which it stood, and the surrounding wild country, all now covered and its features obliterated by many square miles of bricks and mortar. Mr. Green shows how it was that what was destined to be the greatest city in the world came to be planted where it is, and how its future progress was determined by the physical conditions of its site.

"The commercial greatness of London has made men forget its military importance, but from the first moment of its history till late into the middle ages London was one of the strongest of our fortresses. Its site, indeed, must have been dictated, like that of most early cities, by the advantages which it presented as well for defence as for trade. It stood at the one point by which either

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merchant or invader could penetrate from the estuary into the valley of the Thames; and in its earlier days, before the great changes wrought by the embankment of the Romans, this was also the first point at which any rising ground for the site of such a town presented itself on either shore of the river. Nowhere has the hand of man moulded ground into shapes more strangely contrasted with its natural form than on the site of London. Even as late as the time of Cæsar the soil which a large part of it covers can have been little but a vast morass. Below Fulham the river stretched at high tide over the ground that lies on either side of its present channel from the rises of Kensington and Hyde Park to the opposite shores of Peckham and Camberwell. All Pimlico and Westminster to the north, to the south all Battersea and Lambeth, all Newington and Kennington, all Bermondsey and Rotherithe, formed a vast lagoon, broken only by little rises which bec me the "eyes" and "hithes," the "islands" and "landing-rises," of later settlements. Yet lower down to the eastward the swamp widened as the Lea poured its waters into the Thames in an estuary of its own, an estuary which ran far to the north over as wide an expanse of marsh and fen, while at its mouth it stretched its tidal waters over the mud flats which have been turned by embankment into the Isle of Dogs. Near the point where the two rivers meet, a traveller who was mounting the Thames from the sea saw the first dry land to which his bark could steer. The spot was in fact the extremity of a low line of rising ground which was thrown out from the heights of Hampstead that border the river valley to the north, and which passed over the sites of our Hyde Park and Holborn to thrust itself on the east into the great morass. This eastern portion of it, however, was severed from the rest of the rise by the deep gorge of a stream that fell from the northern hills, the stream of the Fleet, whose waters, long since lost in London sewers, ran in earlier days between steep banks—banks that still leave their impress in the local levels, and in local names like Snow Hill—to the Thames at Blackfriars. The rise or 'dun' that stretched from this tidal channel of the Fleet to the spot now marked by the Tower, and which was destined to become the site of London, rose at its highest some fifty feet above the level of the tide, and was broken into two parts by a ravine through which ran the stream which has since been known as the Wallbrook. Such a position was admirably adapted for defence; it was indeed almost impregnable. Sheltered to east and south by the Lagoons of the Lea and the Thames, guarded to westward by the deep cleft of the Fleet, it saw stretching along its northern border the broad fen whose name has survived in our modern Moorgate. Nor, as the first point at which merchants could land from the great river, was the spot less adapted for trade. But it was long before the trader found dwelling on its soil. Old as it is, London is far from being one of the oldest of British cities; till the coming of the Romans, indeed, the loneliness of its site seems to have been unbroken by any settlement whatever. The 'dun' was in fact the centre of a vast wilderness. Beyond the marshes to the east lay the forest track of southern Essex. Across the lagoon to the south rose the woodlands of Sydenham and Forest Hill, themselves but advance guards of the fastnesses of the Weald. To the north the heights of Highgate and Hampstead were crowned with forest-masses, through which the boar and the wild ox wandered without fear of man down to the days of the Plantagenets. Even the open country to the west was but a waste. It seems to have formed the border-land between two British tribes who dwelt in Hertford and in Essex, and its barren clays were given over to solitude by the usages of primæval war."

Much more that must be of interest to those familiar with modern London does Mr. Green tell us about the early city and its progress, and the influence upon it history, of its site, and the nature of the surrounding country. But these extracts will give the reader a fair idea of the method pursued by Mr. Green in this most interesting volume. The work contains numerous maps showing the condition of the surface in the various regions of the country at the time that the Saxons, Jutes, and Angles were with ruthless vigour laying the foundation of modern England and modern English history. Mr. Green, of course, discusses many incidental questions of interest, among others the extent to which the Celtic element remained after the settlement of the invaders, and influenced their blood and their character. Mr. Green essentially adopts the views advocated by Mr. Freeman, though his Teutonism does not appear to us to be quite so extreme. He brings his history down to about the year 830, when it may be said that England was roughly shaped into those outlines, topographical and social, of which the present conditions are the lineal development.

NOTES

AT a recent meeting of the Trustees of the Lewes Studentship in Physiology, which was founded by the late "George Eliot" in memory of her husband, Mr. George Henry Lewes, the vacancy occasioned by the appointment of Dr. Roy to the Brown Professorship of Pathology in the University of London was filled up, according to the terms of the Trust, by the election of Mr. L. C. Wooldridge, D.Sc. (Lond.). Dr. Wooldridge is a former student of Guy's Hospital, who has lately been working in Prof. Ludwig's laboratory at Leipzig. He has already made investigations of importance, one of which, on the part taken by the white corpuscles in the coagulation of the blood, has been read before the Royal Society. The studentship is for three years, and its conditions provide for the holder devoting himself during that time to physiological researches. Wisely administered, such endowments of research are invaluable, and it is to be wished that there were more of them. The first appointment of the Trustees led to the brilliant work of Prof. Roy, and we do not doubt that their present choice will be no less amply justified.

THE expedition to be fitted out at the expense of M. Bischoffsheim to observe the solar eclipse next May in Egypt, will include M. Perrotin, director of the Nice Observatory, who will attend specially to the search for intra-Mercurial planets, and M. Thollon, who will have charge of the spectroscopic work. They will be accompanied by M. Guérain, photographer to the Paris Observatory.

THE collection of fossil fishes in the British Museum has lately received an immense addition by the transference from Florence Court to the new museum at Cromwell Road of the very extensive and important collection of the Earl of Enniskillen, and when in the course of a few weeks it receives the collection of the late Sir P. G. Egerton, which the Trustees have also purchased, the museum will contain a probably unrivalled collection of fossil fish. The collections of the late Sir P. G. Egerton and of the Earl of Enniskillen were commenced in 1826, when they were fellow-students at Oxford.

THE first annual general meeting of the Sanitary Protection Association was held on Saturday in the rooms of the Society of Arts in the Adelphi. Prof. Huxley, having read the report, pointed out that the Society, though it had only been in existence for a short time, had worked successfully. The houses examined had not been the dwellings of poor people, and therefore liable to be found in an insanitary condition, but had been houses occupied by well-to-do people, and of these 6 per cent. were in an absolutely pestiferous condition, leaving it to be the merest chance that they

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